

## CLAIMS

*Sub A1>* 1. System for assembling a first part (5) to a second part (2, 9) by means of a ball anchoring device featuring a basically cylindrical lock body (10) comprising a central bore (13) and an annular wall (14) 5 featuring radial holes (15) to accommodate radially mobile balls (16), and a locking piston (20) that slides axially within the body bore between a released position and a locked position where a piston head (22) keeps the balls pressed outwards and protruding from the surface of 10 the body, the two parts featuring surfaces that are applied against each other,

characterized in that the lock body (10) is inserted into a first hole (7) made in the surface of the first part and into a second hole (8) made in the surface 15 of the second part, the two holes being more or less coaxial, the lock body features a flange (12) bearing against the free surface of the first part around the first hole through a spring thrust element (18), and the balls (16) are maintained partly protruding under the 20 free surface (82) of the second part, on the one hand in angular contact with the edge (81) of the second hole (8) opening into the said free face of the second part, and on the other hand bearing against a lateral retaining 25 surface (23) of the piston head (22), the said lateral surface displaying in the area of contact of each ball a gradient such that under the effect of the axial thrust applied to the balls by the body through the load applied to the flange (12) by the spring thrust element (18), the contact of each ball on the said lateral surface maintains the piston (20) in the locked position.

*Sub C2>* 2. Assembly system in accordance with claim 1, characterized in that the spring thrust element is a

tapered washer (18) encircling the body (10).

Sub B12. Assembly system in accordance with claim 1, characterized in that it features a snap ring (17) that 5 encircles the body, the said snap ring being designed to maintain the balls (16) in a retracted position in the holes in the body before the body is inserted into the holes in the parts to assemble and when the piston (20) is in the released position, and where the diameter of at 10 least one of the holes (7, 8) is smaller than the outside diameter of the snap ring (17).

4. Assembly system in accordance with claim 1, characterized in that the body (10) joined to the first 15 part (5) by one or more lugs (51) attached to the first part and holding the flange (12) and the spring thrust element (18) gripped between the said lug(s) and the surface (55) of the first part.

20 5. Assembly system in accordance with claim 1, characterized in that the piston (20) features a rod (21) whose far end (28) opposite to the piston head protrudes beyond the body and features a means of gripping (29) on which a release tool (40) can be fitted to move the 25 piston out of its locking position.

6. Assembly system in accordance with claim 3, characterized in that the tip of the piston head (22) beyond the lateral retaining surface has a recess (25) 30 that accommodates the balls (16) when they are held in the retracted position by the snap ring (17), the said recess featuring a far edge (26) that turns outwards towards the periphery and, by axially abutting on the said balls in the retracted position, prevents the piston 35 from coming out of the body.

7. Ball-locking type attaching device comprising:

- a basically cylindrical lock body (10) comprising a central bore (13) and an annular wall (14) featuring radial holes (15) to accommodate radially mobile balls 5 (16), and a locking piston (20) that slides axially within the body bore between a released position and a locked position

- a snap ring (17) that encircles the body (10) around the said holes (15) to contain the balls (16) 10 radially from the exterior of the body, and which can be moved axially along the body to free the said balls,

characterized in that, in order to be used for an assembly system in accordance with one of claims 1 to 6:

- the lock body (10) features a flange (12) under 15 which a spring thrust element (18) is retained axially by the said snap ring (17),

- the piston has a head (22) suitably shaped:

- firstly, to contain the balls from the interior 20 of the body when it is in the released position, in which case the balls are retained from the exterior by the snap ring (17), and

- secondly, by intentionally provoked sliding of 25 the piston (20) towards the locked position, to push the balls outwards once they have been released due to the sliding of the snap ring along the body to a locking position where the said balls protrude with respect to the outer surface of the body (10) and to maintain the balls in the said locked position,

30 the piston head (22) also featuring a lateral retention surface (23) which cooperates with the balls (16) and displays a gradient in the contact zone of each ball such that when the balls are kept pushed outwards in the locked position by the piston, they act on the said retention means to prevent free movement of the piston 35 towards the released position.

8. Attaching device in accordance with claim 7,  
characterized in that the piston head (22) features means  
of maintaining the piston in the released position  
as long as the balls (16) are retained by snap ring (17).

9. Attaching device in accordance with claim 8,  
characterized in that the said means of holding the  
piston consist of a recessed shape (25) made in the end  
section of the cylindrical surface of the piston head,  
such that the balls are kept in the said recessed shape  
by the snap ring.

10. Attaching device in accordance with claim 7,  
characterized in that the piston retention surface is  
formed by a tapered surface (23) of the piston head whose  
larger diameter (24) is situated beyond the balls (16)  
when the piston is in the locked position.

20 > A' 11. Process for producing an assembly system in  
accordance with one of claims 1 to 6, characterized in  
that an attaching device in accordance with one of claims  
7 to 10 is offered up opposite the holes (7, 8) in the  
surfaces of the parts (5, 2) to be assembled, with the  
piston (20) in the released position and the snap ring  
(17) covering the balls; an axial thrust force (F) is  
applied to the protruding end (28) of the piston so as to  
insert the body (10) of the device into the holes until  
the balls (16) are situated partly below the unobstructed  
surface (82) of the surface (9) of the second part, with  
snap ring (17) being retained by one of the surfaces, the  
thrust force is maintained to compress the spring thrust  
element (18) between the flange (12) and the surface (55)  
of the first part, and then move the piston (20) to the  
locked position.

> A' & B' >